

# Missouri Wild Turkey Harvest and Population Status Report 2020

Missouri Department of Conservation – Resource Science Division



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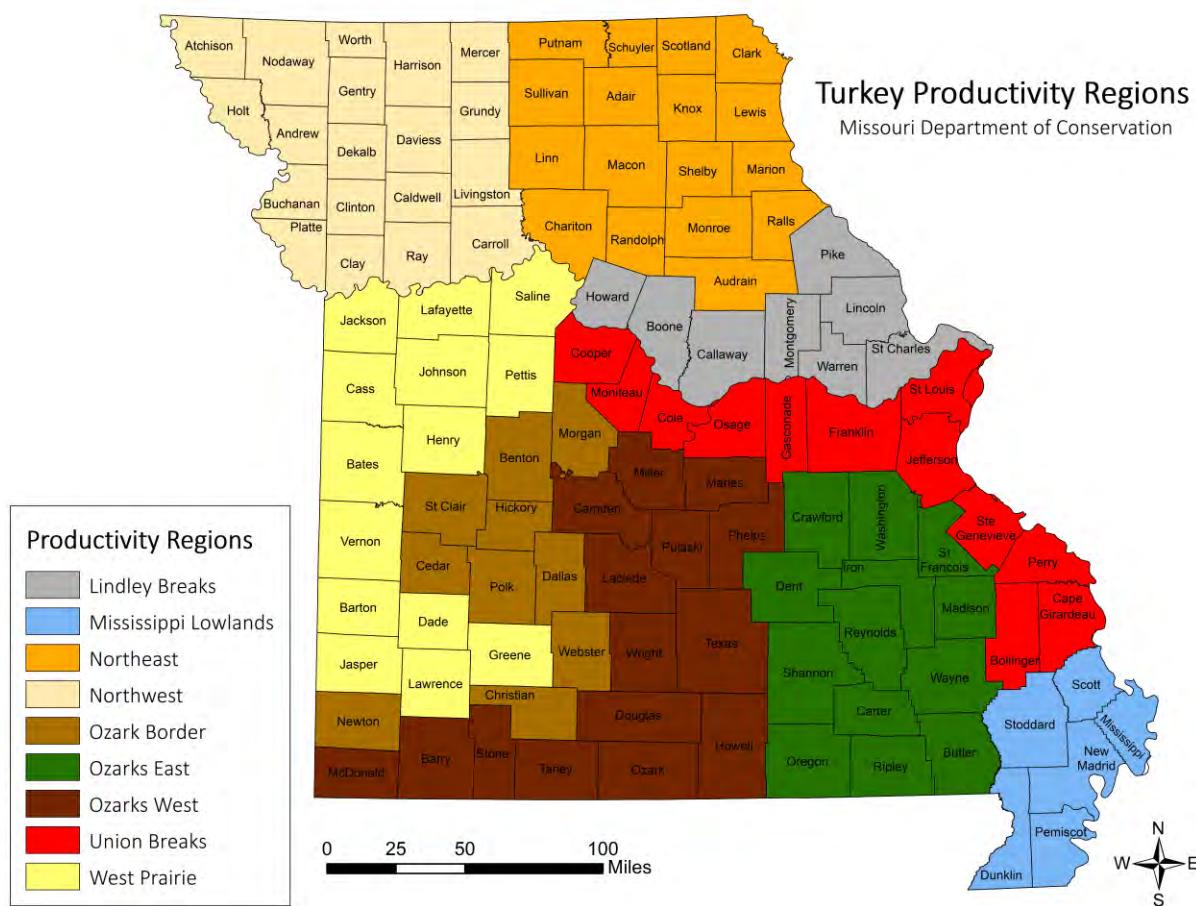


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## POPULATION STATUS

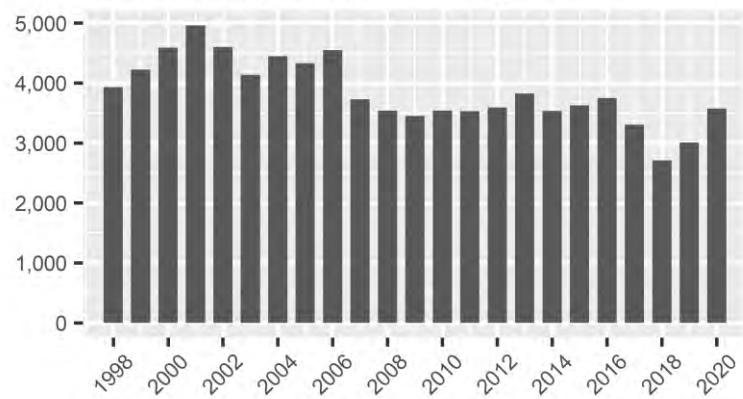


**Figure 1. Turkey Productivity Regions in Missouri. Regions consist of counties grouped by similar land cover composition.**

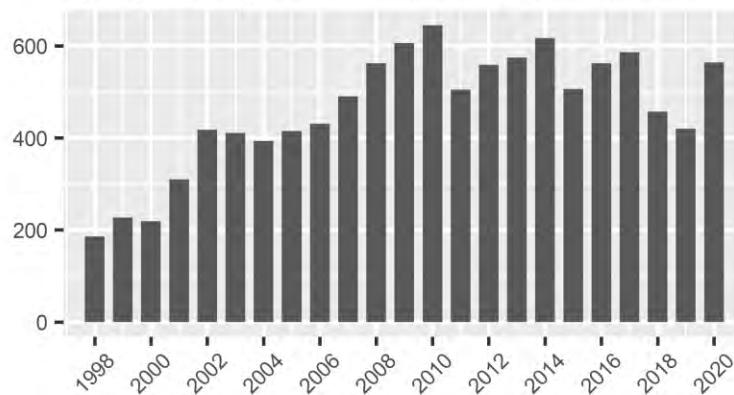
### Lindley Breaks Region

Turkey abundance in the Lindley Breaks Region peaked in the early 2000s before declining about 30% from 2001-2009. Abundance stabilized from 2010-2016 before declining sharply from 2016-2018. Though harvest has increased the past two years, the five- and ten-year spring turkey harvest trends in the Lindley Breaks Region indicate a declining population.

### Spring Turkey Harvest: Lindley Breaks



### Spring Turkey Harvest: Mississippi Lowlands



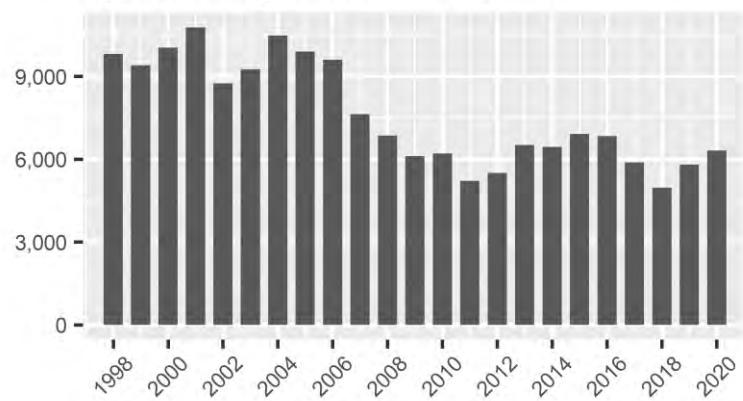
### Mississippi Lowlands Region

The turkey population in the Mississippi Lowlands Region increased during the 2000s. However, turkey abundance in this region has always been low compared to the other regions, and because of this, harvest tends to vary greatly on an annual basis. The five- and ten-year spring turkey harvest trends in the Mississippi Lowlands Region indicate a declining population.

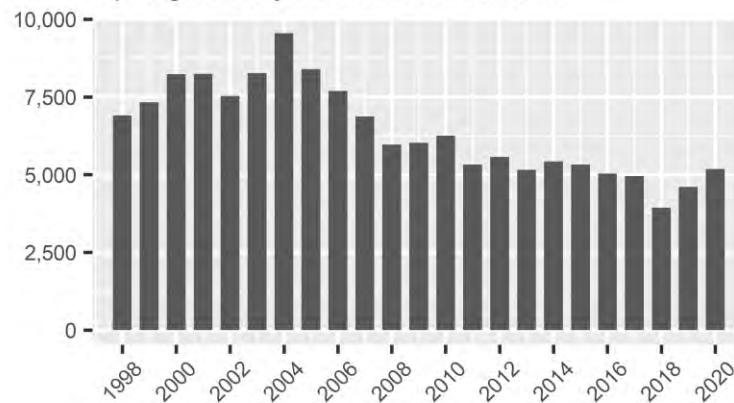
### Northeast Region

The Northeast Region experienced six consecutive years of poor production, leading to a roughly 40% decline in abundance during the late 2000s. However, improved production in 2011 and 2014 caused abundance to increase and stabilize. Harvest did decline from 2016-2018 but has increased in recent years. The five-year spring turkey harvest trend in the Northeast Region indicates a declining population while the ten-year trend indicates a stable population.

### Spring Turkey Harvest: Northeast



### Spring Turkey Harvest: Northwest



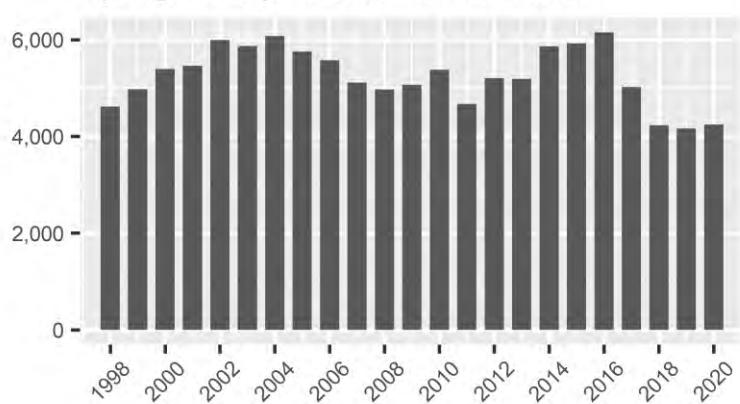
### Northwest Region

The Northwest Region experienced a sharp decline in abundance in the late 2000s due to poor production. Abundance appeared to stabilize from 2011-2015, and after a decline in harvest from 2017-2018, harvests in recent years have increased. The five-year spring turkey harvest trend in the Northwest Region indicates a stable population, while the ten-year trend indicates a declining population.

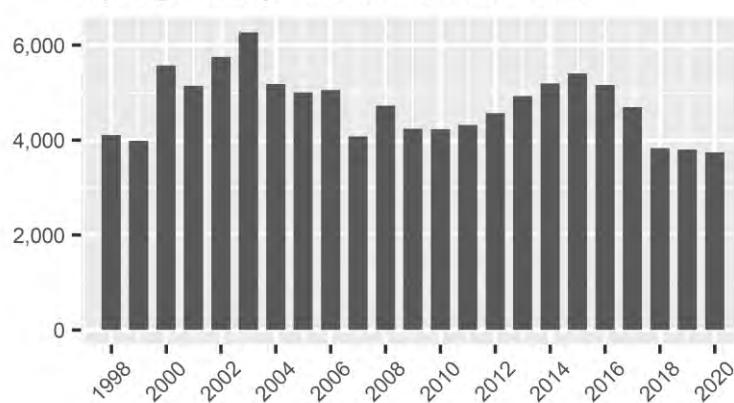
### Ozark Border Region

Turkey abundance in the Ozark Border Region peaked in the early 2000s before declining during the mid-to-late 2000s. Abundance increased from 2011-2016 before sharply dropping from 2016-2018. Harvests have stabilized in recent years. The five- and ten-year spring turkey harvest trends in the Ozark Border Region indicate a declining population.

### Spring Turkey Harvest: Ozark Border



### Spring Turkey Harvest: Ozarks East



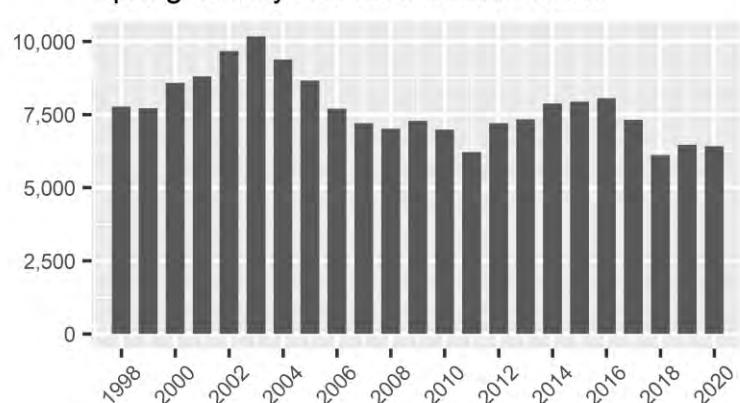
### Ozarks East Region

The turkey population in the Ozarks East Region declined during the late 2000s, but after several years of improved production, abundance increased from 2011-2015. The harvest declined again from 2016-2018 but has leveled-off in recent years. The five- and ten-year spring turkey harvest trends in the Ozarks East Region indicate a declining population.

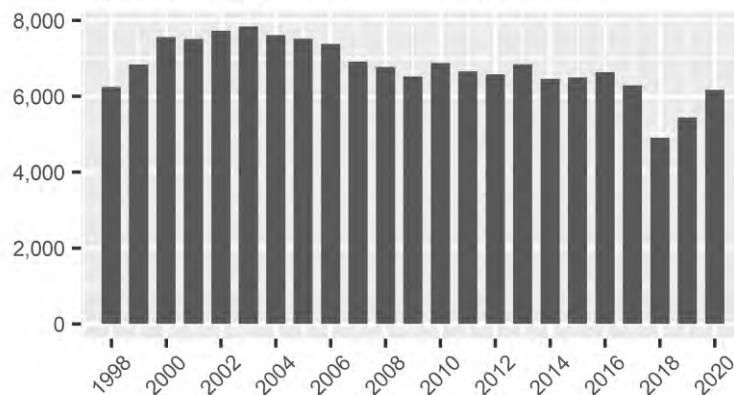
### Ozarks West Region

Turkey abundance in the Ozarks West Region peaked in the early 2000s, followed by sharp declines during the mid-to-late 2000s. Improved production resulted in an increasing trend in spring harvest from 2011-2016. The harvest declined again from 2016-2018 but has leveled-off in recent years. The five- and ten-year spring turkey harvest trends in the Ozarks West Region indicate a declining population.

### Spring Turkey Harvest: Ozarks West



### Spring Turkey Harvest: Union Breaks



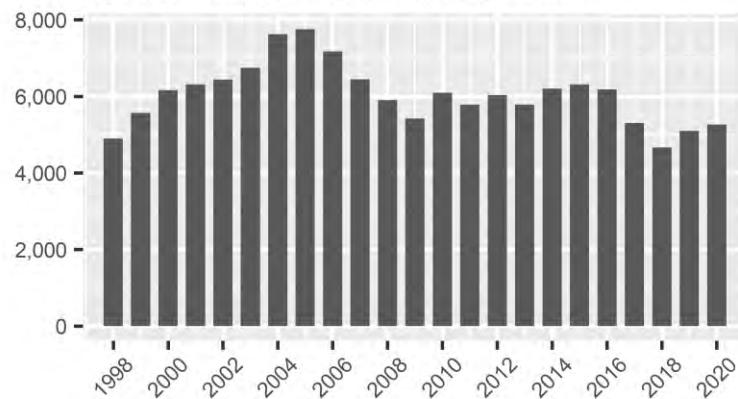
### Union Breaks Region

Turkey abundance in the Union Breaks Region peaked in the early 2000s. Abundance gradually declined during the mid-to-late 2000s and was stable from 2009-2017. After a sharp decline in harvest during 2018, harvest has increased during the past couple of years. The five- and ten-year spring turkey harvest trends in the Union Breaks Region indicate a declining population.

### West Prairie Region

The West Prairie Region turkey population peaked in the early-to-mid 2000s, and after declining from 2006-2009, abundance increased from 2010-2015. Harvest did decline from 2016-2018 but has increased in recent years. The five- and ten-year spring turkey harvest trends in the West Prairie Region indicate declining abundance.

### Spring Turkey Harvest: West Prairie



## PRODUCTION – WILD TURKEY BROOD SURVEY

The Missouri Department of Conservation (MDC) has been conducting a Wild Turkey Brood Survey annually since 1959. During the survey, Department staff and citizen volunteers record observations of hens, pouls, and gobblers during June, July, and August. Turkey sightings are recorded on observation cards, which the MDC mails to participants at the beginning of each survey month. By recording observations of hens and pouls, survey participants provide information that serves as an index to turkey production. It is through this survey that the MDC determines the success of each year's turkey hatch. Turkey observations are collected at the county-level and analyzed by Turkey Productivity Region (Figure 1), which are counties grouped by similar land cover composition. Conservation Department staff determines the percentage of hens observed with and without pouls, and the average number of pouls per hen for those hens observed with a brood. Observations of hens and pouls are used to determine the poult-to-hen ratio (PHR), which is the average number of pouls per hen. The PHR includes observations of hens with a brood and those observed without a brood.

In 2020, MDC staff and citizen volunteers recorded observations of over 62,000 turkeys during the three-month survey. The 2020 statewide poult-to-hen ratio (PHR) was 1.0, which was 11% greater than the 2019 PHR and equal to the previous five-year average (Figure 2, Table 1). However, this year's PHR was 17% lower than the 10-year average and 29% lower than the 20-year average (Table 1). Regional PHRs in 2020 ranged from 0.7 in the Ozark Border, Ozarks West, and West Prairie Regions to 1.4 in the Northeast and Northwest Regions (Figure 1, Table 1). Compared to the five-year averages, production in 2020 was higher in the Northeast, Northwest, and Union Breaks Regions and lower in the Mississippi Lowlands, Ozark Border, Ozarks East, Ozarks West, and West Prairie Regions (Table 1). Production in the Lindley Breaks Region was equal to the five-year average for that region (Table 1).

At the statewide scale, 38% of hens were observed with a brood, which was up from 34% in 2019 and was 11% greater than the 5-year average (Table 2). The percentage of hens observed with a brood ranged from 29% in the Ozark Border Region to 50% in the Mississippi Lowlands Region (Table 2). Statewide, the average number of pouls per brood was 3.8, which was up from 3.7 in 2019 and 2% greater than the five-year average (Table 2). The average number of pouls per brood ranged from 3.2 in the West Prairie Region to 4.3 in the Mississippi Lowlands, Northeast, and Northwest Regions (Table 2).

**Table 1. Index (poult-to-hen ratio) of Missouri wild turkey production by Turkey Productivity Region (Figure 1). Data were obtained during the Conservation Department's Wild Turkey Brood Survey in 2020 and are compared to the previous year and the average for periodic intervals.**

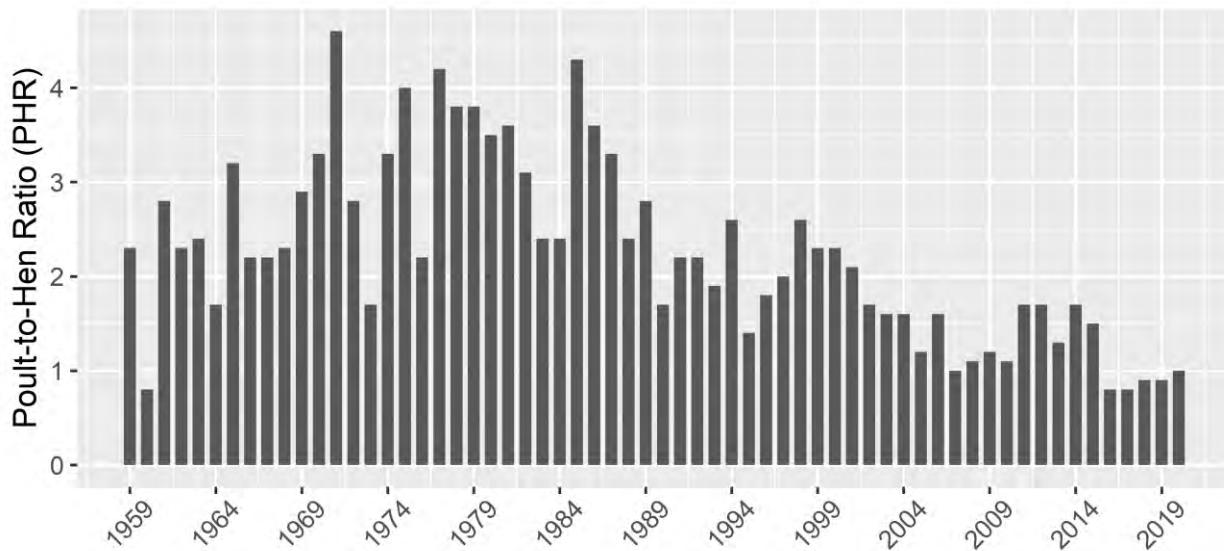
| Productivity Region          | 2020 Index | 1-Year (2019) Change | 5-Year (2015-2019) Change | 10-Year (2010-2019) Change | 20-Year (2000-2019) Change |
|------------------------------|------------|----------------------|---------------------------|----------------------------|----------------------------|
| Lindley Breaks               | 1.1        | 22%                  | No Change                 | -21%                       | -27%                       |
| MS Lowlands                  | 1.1        | -35%                 | -21%                      | -27%                       | -48%                       |
| Northeast                    | 1.4        | 75%                  | 40%                       | 8%                         | No Change                  |
| Northwest                    | 1.4        | 56%                  | 8%                        | No Change                  | -7%                        |
| Ozark Border                 | 0.7        | No Change            | -22%                      | -36%                       | -46%                       |
| Ozarks East                  | 1.0        | No Change            | -9%                       | -33%                       | -38%                       |
| Ozarks West                  | 0.7        | -22%                 | -22%                      | -42%                       | -50%                       |
| Union Breaks                 | 1.2        | 20%                  | 20%                       | No Change                  | -14%                       |
| West Prairie                 | 0.7        | -13%                 | -13%                      | -36%                       | -42%                       |
| <b>Statewide<sup>a</sup></b> | <b>1.0</b> | <b>11%</b>           | <b>No Change</b>          | <b>-17%</b>                | <b>-29%</b>                |

<sup>a</sup>Statewide totals include observations where Productivity Region was not recorded on the survey form.

**Table 2. Data obtained during the Missouri Department of Conservation's Wild Turkey Brood Survey, listed by Turkey Productivity Region (Figure 1), 2020.**

| Productivity Region          | % Hens w/ Brood | Average Brood Size | Poult-to-Hen Ratio | Gobbler-to-Hen Ratio |
|------------------------------|-----------------|--------------------|--------------------|----------------------|
| Lindley Breaks               | 37%             | 3.8                | 1.1                | 0.7                  |
| MS Lowlands                  | 50%             | 4.3                | 1.1                | 0.6                  |
| Northeast                    | 38%             | 4.3                | 1.4                | 0.7                  |
| Northwest                    | 39%             | 4.3                | 1.4                | 0.8                  |
| Ozark Border                 | 29%             | 3.6                | 0.7                | 0.7                  |
| Ozarks East                  | 35%             | 3.8                | 1.0                | 0.4                  |
| Ozarks West                  | 36%             | 3.3                | 0.7                | 0.7                  |
| Union Breaks                 | 46%             | 3.9                | 1.2                | 0.5                  |
| West Prairie                 | 32%             | 3.2                | 0.7                | 0.8                  |
| <b>Statewide<sup>a</sup></b> | <b>38%</b>      | <b>3.8</b>         | <b>1.0</b>         | <b>0.6</b>           |

<sup>a</sup>Statewide totals include observations where Productivity Region was not recorded on the survey form.

**Figure 2. Missouri statewide poult-to-hen ratios derived from the Wild Turkey Brood Survey conducted in June, July, and August, 1959-2020.**

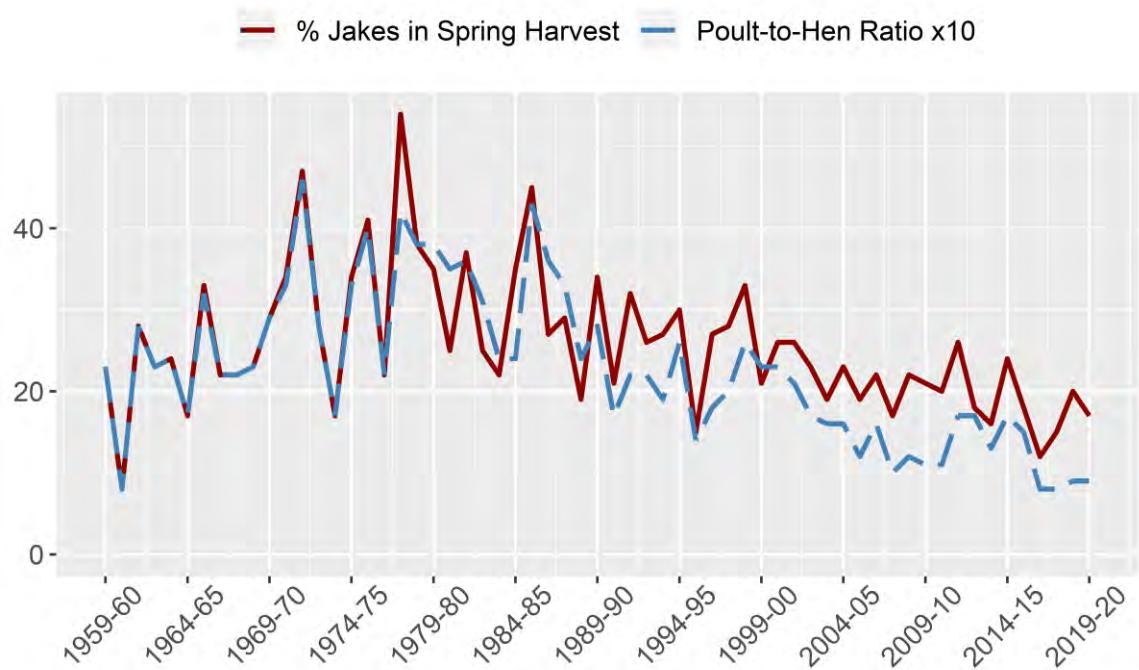
## HARVEST

### 2020 Spring Turkey Season

During the 2020 youth spring turkey season, which took place April 4-5, hunters harvested 2,724 turkeys. This harvest total represented a 7% increase from the 2019 youth season but was 19% less than the previous five-year average youth season harvest total. In 2020, a total of 18,133 youth permits were sold which included 17,172 resident youth and 961 non-resident youth permits. The total number of youth permits sold in 2020 was 24% greater than the number sold in 2019.

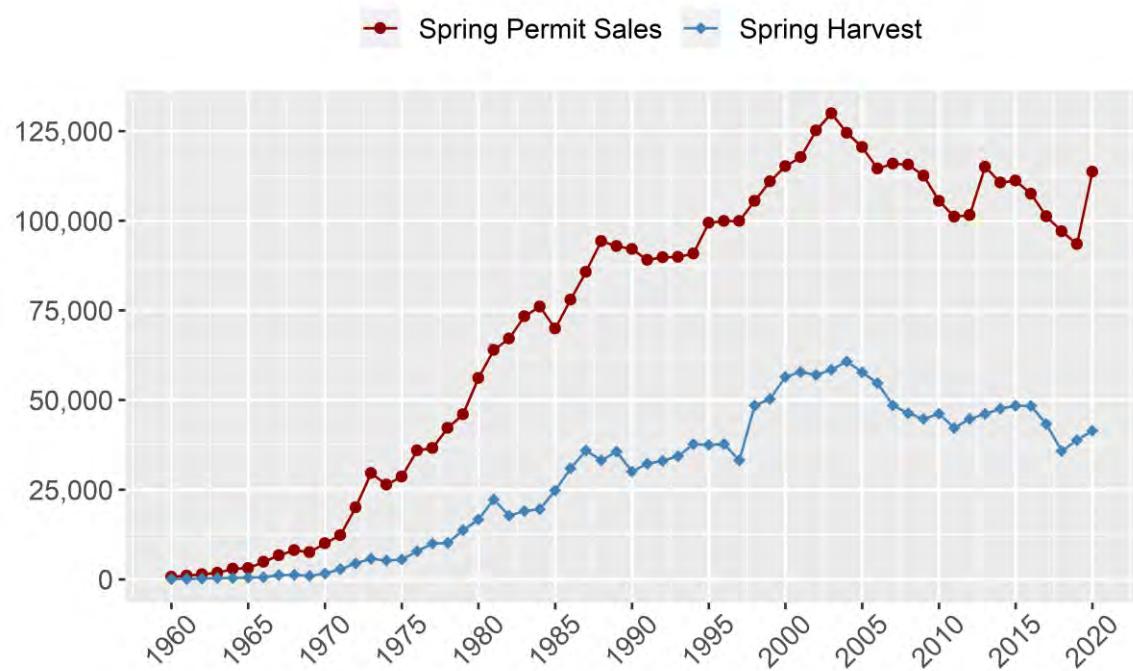
During the 2020 regular spring turkey season, which took place April 20 – May 10, hunters harvested 38,737 turkeys. This harvest total represented a 7% increase from the 2019 regular season. Juvenile male turkeys represented 17% of the regular season harvest (Figure 3), which was 4% less than the previous five-year average.

The total 2020 spring turkey harvest, including both the youth and regular seasons was 41,461. This harvest total was 7% more than the 2019 harvest total but was 3% less than the previous five-year average (Figure 4). Counties with the highest total spring harvest were Franklin, Callaway, and Miller where 962, 760, and 714 turkeys were harvested, respectively (Figure 5). Total permit sales for the 2020 spring turkey season (113,649; excluding no-cost landowner permits) were 22% greater than in 2019 and 11% greater than the previous five-year average (Figure 4). Spring turkey permits sales in 2019 included 106,564 (94%) resident permits and 7,085 (6%) nonresident permits. An additional 21,614 no-cost permits were distributed to landowners. The total number of unique spring turkey hunters in Missouri in 2020 was 133,022, which was 8% more than in 2019 but 3% less than the previous five-year average. Note that the total number of hunters does not equal the permit sales total because some hunters purchase a permit in addition to receiving a no-cost landowner permit.

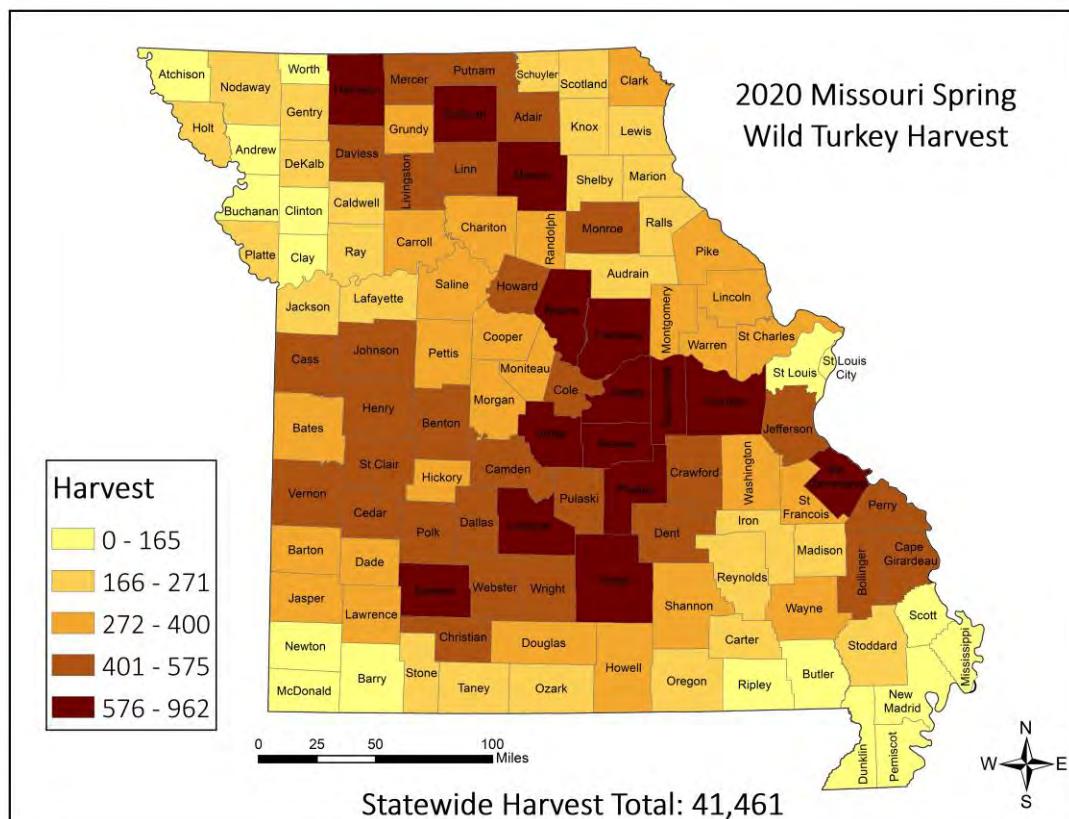


**Figure 3. Missouri's statewide poult-to-hen ratio multiplied by 10, compared with the percentage of jakes in the following year's regular season spring harvest, 1959-2020.**





**Figure 4.** Number of wild turkeys harvested during the spring season (youth and regular season) in Missouri and the number of turkey hunting permits sold for the spring season, 1960-2020. Permit sales do not include no-cost landowner permits.

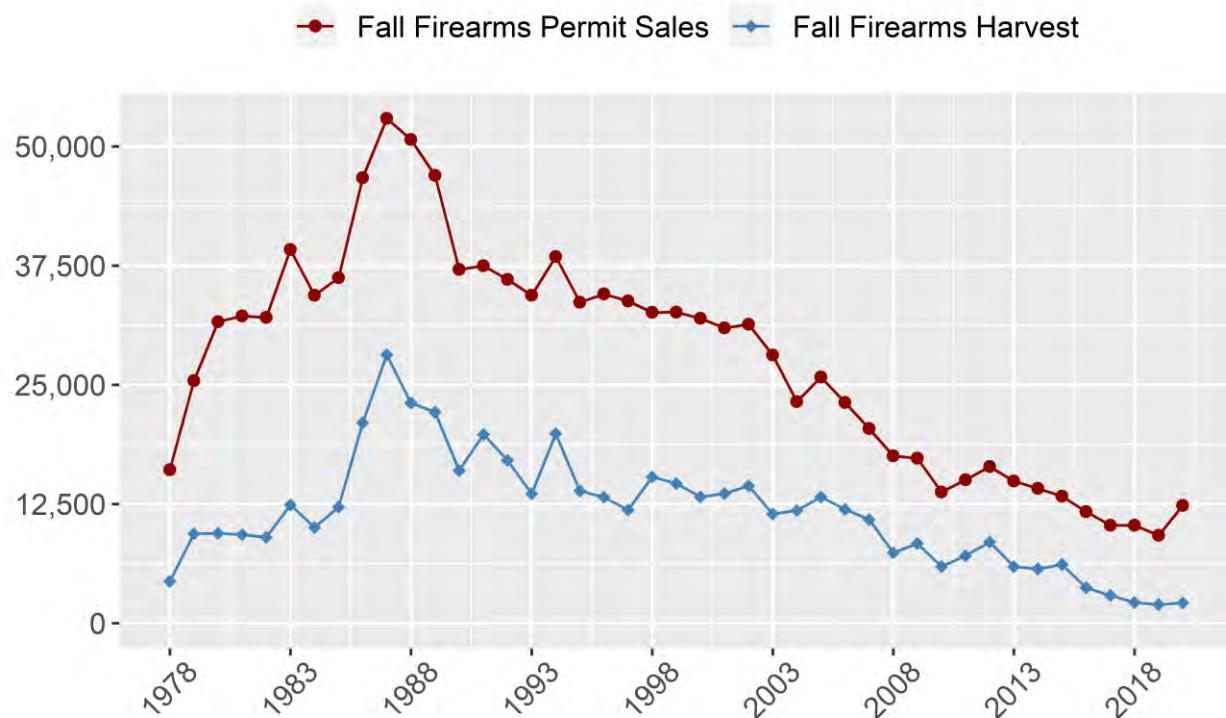


**Figure 5.** Total (youth and regular season) spring wild turkey harvest in Missouri, 2020.

## 2020 Fall Firearms Turkey Season

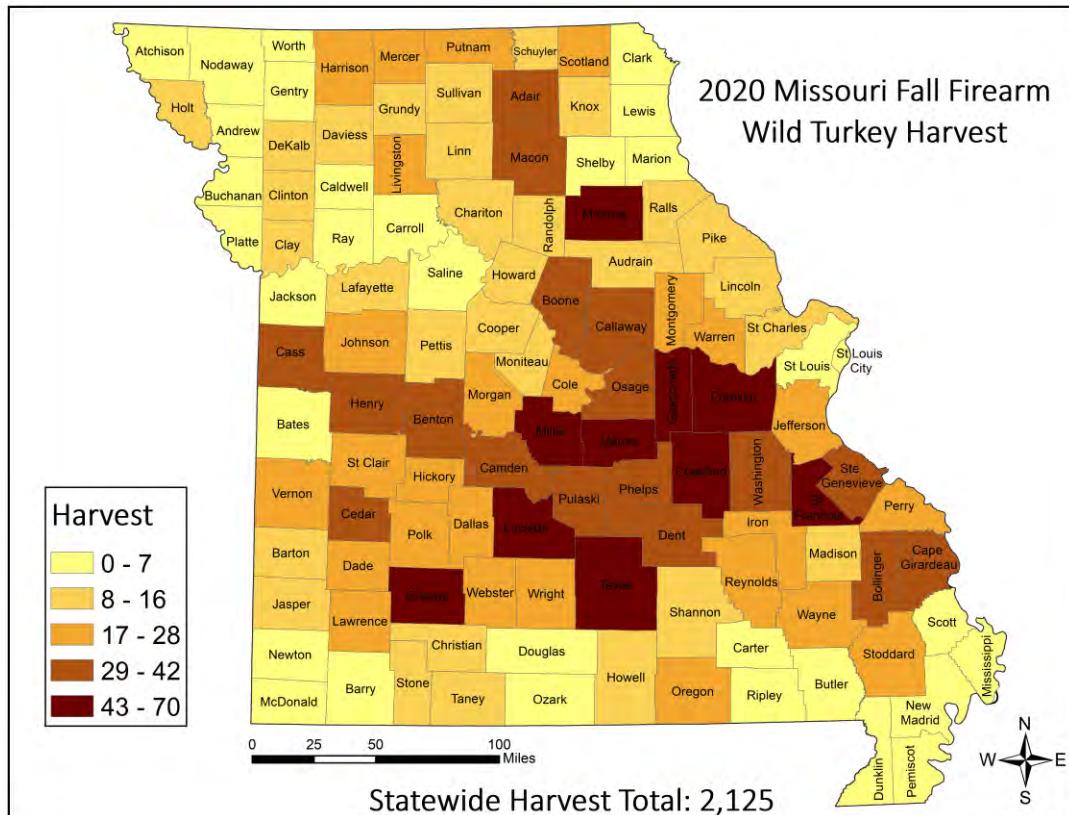
The 2020 fall firearms turkey harvest total of 2,125 was 9% greater than the 2019 harvest total but was 37% below the previous five-year average (Figure 6). The majority of the fall firearms harvest occurred in southern Missouri (Figure 7). The top harvest counties were Greene (70), Maries (58), and Franklin (55).

The fall firearms turkey permit sales total in 2020 (12,329) was 34% greater than the record-low 2019 permit sales total (9,195). This year was an exception to the long-term declining trend in fall firearms turkey hunting participation in Missouri (Figure 6).



**Figure 6. Number of wild turkeys harvested during the fall firearms turkey season in Missouri and the number of fall firearms permits sold, 1978-2020. Permit sales do not include no-cost landowner permits.**





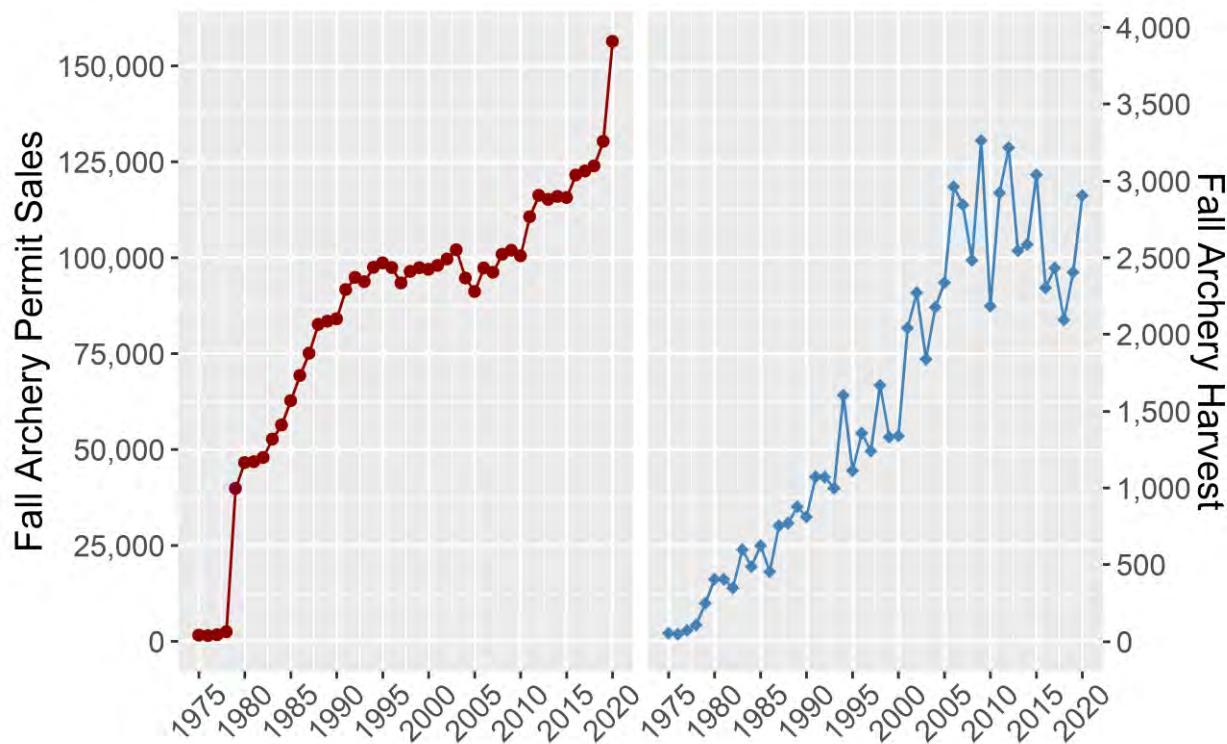
**Figure 7. Missouri fall firearms wild turkey harvest, 2020.**



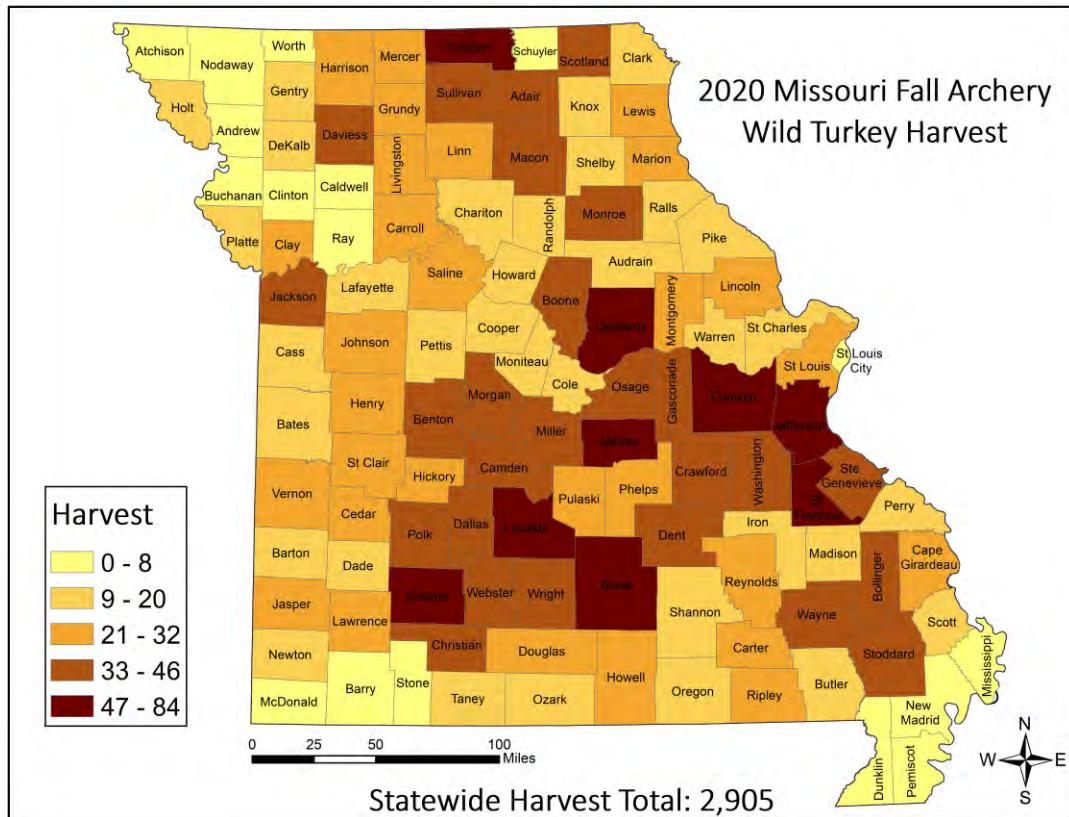
## 2020 Fall Archery Turkey Season

Hunters harvested 2,905 turkeys during the 2020 fall archery deer and turkey season (Figures 8). The 2020 archery turkey harvest total was 21% greater than the 2019 harvest total and 18% greater than the previous five-year average (Figure 8). The top three harvest counties were Greene (84), Franklin (78), and Texas (61) (Figure 9). Unlike the fall firearms turkey harvest, which has shown a declining trend since the late 1980s (Figure 6), the fall archery harvest increased until the mid-2000s. Since 2005, archery turkey harvests have fluctuated substantially on an annual basis, while exhibiting an increasing trend over the last two years (Figure 8).

Although archery permit sales were relatively stable from the mid-1990s through the mid-2000s, sales have since shown an increasing trend. In 2020, 156,342 fall archery hunting permits were sold, the highest number since the season's inception, and a 20% increase from the 2019 permit sales total (130,281) (Figure 8).



**Figure 8. Missouri fall archery permit sales, 1975-2020, compared to fall archery turkey harvest 1975-2020. Permit sales do not include no-cost landowner permits. In 1979, the archery deer and archery turkey permits were combined into one permit.**

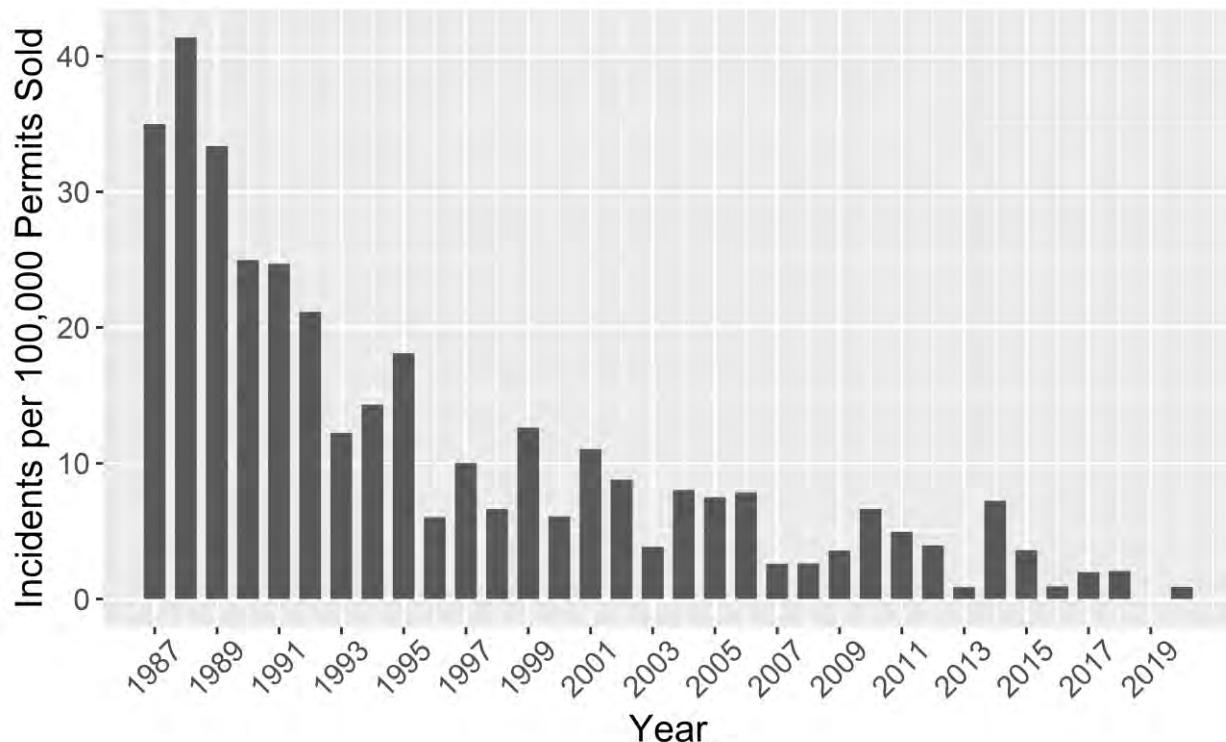


**Figure 9. Wild turkey harvest in Missouri during the 2020 fall archery season.**



## HUNTING INCIDENTS

There was one hunting incident during the 2020 spring turkey season. The number of spring turkey hunting incidents in Missouri has declined considerably over the course of the last three decades. During the late 1980s, more than 30 incidents occurred annually for every 100,000 permits sold. During the last five hunting seasons, the average number of incidents per 100,000 permits sold is 1.2 (Figure 10).



**Figure 10. Hunting incidents during the spring turkey season in Missouri per 100,000 permits sold, 1987-2020.**

## RECENT REGULATION CHANGES

Other than changes to some Conservation Area regulations and managed spring turkey hunts, no turkey hunting regulation changes occurred in 2020.



## FACTORS INFLUENCING WILD TURKEY NEST SUCCESS AND POULT SURVIVAL IN NORTH MISSOURI RESEARCH PROJECT

### Overview

Wild turkey production has exhibited a long-term declining trend, with recent hatches being especially poor. Nest success and poult survival rates from the previous north Missouri study were lower than many previously reported estimates from the literature, and the poult-to-hen ratios calculated from the summer brood survey during the past 4 years are some of the lowest in the state's history. Because of low recruitment, turkey abundance in Missouri could be at its lowest level in decades, generating concern about long-term population viability. Density dependence, large-scale landscape change, changing weather patterns, decreasing insect abundance, and increasing populations of some mesocarnivores could be adversely affecting turkey production. Since these factors have traditionally been studied in isolation, there is an incomplete understanding of how these factors are affecting turkey populations. Improving our understanding of factors affecting turkey nest success and poult survival would provide important information when communicating about declining turkey production and abundance with concerned stakeholders. This information would also inform habitat management efforts on public and private lands in Missouri to increase turkey recruitment and ultimately abundance.

Objectives of this five- and one-half-year cooperative research project with the University of Missouri include:

1. Determine the most effective method of attaching radio-transmitters to turkey poult.
2. Determine how weather (temperature and precipitation), landscape characteristics, predator densities, and their interactions affect turkey nest success.
3. Determine how weather (temperature and precipitation), landscape characteristics, predator densities, and invertebrate abundance affect poult survival, and identify the main causes of poult mortality.
4. Assess turkey brood-rearing habitat selection and determine habitats where turkeys and predators are most likely to interact.

To investigate poult survival and cause-specific mortality, we will deploy Very High Frequency (VHF) radio transmitters onto wild turkey poult. To reduce the potential of researcher-induced poult mortality, we will determine the least invasive and most effective technique for transmitter attachment by testing two methods—glue-on and suture—on captive turkey poult prior to the first field season.

To investigate turkey nest success, poult survival, and brood-rearing habitat selection, we will deploy Global Positioning System-Acceleration-Ultra High Frequency (GPS-ACC-UHF) transmitters on wild turkey hens. Translating ACC data into behavior requires known instances of acceleration attributed to specific behaviors. Thus, we plan to deploy GPS-ACC-UHF tracking devices on captive turkey hens and film >100 instances of common behaviors (e.g., feeding, walking, resting/stationary). We will be able to use the information gathered from the captive turkey hens to determine where, when, and how often wild turkey hens are engaging in specific behaviors.

Field work for this project will cover 4 nesting and brood-rearing seasons (to capture annual variability in covariates), and work will be conducted in Putnam County, Missouri. Hens will be monitored for productivity and poult survival. Wild turkey nest and poult predators will be monitored for occupancy and density. We will evaluate the effects of habitat, weather, and food availability on turkey reproduction by conducting vegetation surveys, collecting temperature and precipitation data, and collecting insects at systematic locations throughout the study area.

## Project Update

In late summer and fall of 2020, researchers at the University of Missouri and MDC constructed an aviary at the University of Missouri's South Farm Research Center. The aviary was designed to house heritage breed domestic poult and hens during the captive trials portion of the project. Eight broods of at least 9 heritage breed domestic poult were obtained within 48 hours of hatching. Within each brood, 3 poult were fit with a VHF radio transmitter that was attached using a glue-on method, 3 poult were fit with a VHF transmitter that was attached using a suture method, and at least 3 poult were not fit with a transmitter (control group). The broods were monitored daily for survival, growth, and transmitter retention. The suture method proved to be the most effective method of transmitter attachment during this captive trial.

After the poult captive trial was complete, the research team obtained 3 heritage breed domestic turkey hens. These hens were fit with the same GPS-ACC-UHF transmitters that would be placed on wild turkey hens that winter. The research team recorded over 40 hours of video of the hens performing various behaviors—foraging, walking, preening, etc. The timing of the video recording, when matched up with the timing of ACC data collection, will allow the research team to translate the ACC data signatures into behaviors. This was an important data collection step, as it will allow the research team to convert ACC data collected from wild turkey hens into known behaviors. This will allow the research team to determine where, when, and for how long wild turkey hens are engaging in certain activities—seeking shelter/cover, foraging for food, etc.—which will be important for evaluating brood-rearing habitat selection.

In January, the research team began locating, baiting, and capturing flocks of wild turkey hens in Putnam County. About 100 hens were captured at 4 different sites across the county. A sample of 51 hens were fitted with transmitters. Forty-eight of the transmitters were battery-powered units and three of the transmitters were experimental solar powered units. So far, the solar powered units have only been transmitting data intermittently, so the sample size for the purpose of data analysis will be the 29 adult and 19 immature hens (48 total) that were marked with the more reliable battery-powered units.

During the 2021 winter trapping season, the research team recaptured 5 hens that were banded and/or radio-marked during a study of wild turkey survival, harvest rates, and reproduction that occurred from 2014-2019 in MDC's Northeast Region (hereafter referred to as the "NEMO turkey study"). Two of the recaptured hens were initially captured in March 2018 as adults, which would mean they are at least 5 years old this year. One of the recaptured hens was initially captured in January 2016 as an adult, which would mean she will be at least 7 years old this year. These three hens were recaptured about 1 mile from their initial capture site during the NEMO turkey study. The remaining two recaptured hens were initially captured as immature females in December 2017 and January 2018, which means they will be 4 years old this year. One of these hens was recaptured ~8 miles from her initial capture site during the NEMO turkey study; the other hen was recaptured ~10 miles from her initial capture site during the NEMO turkey study. The 8–10-mile distance between initial capture and recapture can be explained by the juvenile dispersal period that occurs after a turkey survives their first winter.

Since the completion of the capture season, the research team has been monitoring the reproductive attempts of the GPS-marked hens. The team conducted a mark-recapture effort of raccoons and opossums at sites across the county to determine how nest predator densities vary by land cover type (i.e., larger tracts of forest versus more open, agriculturally dominated areas). The team has deployed trail cameras with scent stations across the county to determine occupancy of larger poult predators (i.e., coyote, fox) in different land cover types. The team has also deployed weather stations to monitor variation in precipitation and temperature across the area. Vegetation surveys are being conducted at nest sites, at foraging sites used by hens with broods, and at random sites around the area. These surveys

will allow the team to determine if vegetative cover influences whether a nest successfully hatches and what sorts of vegetation hens with broods are selecting for versus what is available in the area. The team is also collecting insect samples at the foraging sites used by hens with broods and the random sites to determine which land cover types provide the most food for poult.

We are currently in the middle of the first field season for this research project. We will summarize and share preliminary results from this work as those results become available. We will also provide an update on this project in our annual Wild Turkey Population Status Report for the duration of this effort.



Above: Researchers from the University of Missouri and MDC weigh and measure captive turkey poult to determine if transmitter attachment method influences poult development.

Below: A researcher from the University of Missouri gently encourages captive turkey hens that are fitted with accelerometers to walk in order to capture the data signature for “walking” which informed programming of the GPS-ACC-UHF transmitters that were attached to wild turkey hens.



Left: Researchers from the University of Missouri and MDC carefully attach a battery-powered GPS-ACC-UHF transmitter to a wild turkey hen captured in Putnam County during February 2021.

**APPENDIX A.**

2019 Missouri spring turkey harvest (youth and regular seasons combined).

| County         | Adult Males | Subadult Males | Bearded Hens | Total | Rank <sup>a</sup> |
|----------------|-------------|----------------|--------------|-------|-------------------|
| Adair          | 465         | 47             | 3            | 515   | 25                |
| Andrew         | 126         | 20             | 1            | 147   | 101               |
| Atchison       | 137         | 26             | 1            | 164   | 99                |
| Audrain        | 179         | 32             | 2            | 213   | 92                |
| Barry          | 86          | 34             | 3            | 123   | 108               |
| Barton         | 287         | 34             | 1            | 322   | 63                |
| Bates          | 284         | 43             | 3            | 330   | 62                |
| Benton         | 366         | 82             | 3            | 451   | 37                |
| Bollinger      | 394         | 99             | 9            | 502   | 27                |
| Boone          | 498         | 85             | 4            | 587   | 15                |
| Buchanan       | 108         | 24             | 0            | 132   | 105               |
| Butler         | 79          | 20             | 0            | 99    | 109               |
| Caldwell       | 197         | 58             | 3            | 258   | 75                |
| Callaway       | 596         | 156            | 8            | 760   | 2                 |
| Camden         | 450         | 123            | 2            | 575   | 16                |
| Cape Girardeau | 405         | 110            | 12           | 527   | 20                |
| Carroll        | 313         | 45             | 2            | 360   | 54                |
| Carter         | 144         | 27             | 1            | 172   | 97                |
| Cass           | 360         | 72             | 2            | 434   | 41                |
| Cedar          | 453         | 58             | 7            | 518   | 24                |
| Chariton       | 300         | 41             | 4            | 345   | 58                |
| Christian      | 330         | 110            | 9            | 449   | 39                |
| Clark          | 287         | 33             | 2            | 322   | 64                |
| Clay           | 125         | 16             | 2            | 143   | 102               |
| Clinton        | 109         | 28             | 1            | 138   | 104               |
| Cole           | 365         | 63             | 4            | 432   | 42                |
| Cooper         | 259         | 51             | 2            | 312   | 68                |
| Crawford       | 313         | 137            | 8            | 458   | 36                |
| Dade           | 269         | 63             | 3            | 335   | 60                |
| Dallas         | 371         | 113            | 7            | 491   | 29                |
| Daviess        | 402         | 75             | 3            | 480   | 31                |
| Dekalb         | 163         | 29             | 4            | 196   | 96                |
| Dent           | 358         | 123            | 7            | 488   | 30                |
| Douglas        | 296         | 81             | 4            | 381   | 49                |
| Dunklin        | 10          | 1              | 0            | 11    | 114               |
| Franklin       | 716         | 235            | 11           | 962   | 1                 |
| Gasconade      | 467         | 138            | 8            | 613   | 10                |
| Gentry         | 200         | 29             | 0            | 229   | 88                |
| Greene         | 501         | 131            | 9            | 641   | 7                 |
| Grundy         | 367         | 27             | 6            | 400   | 45                |
| Harrison       | 541         | 73             | 8            | 622   | 9                 |

| County      | Adult Males | Subadult Males | Bearded Hens | Total | Rank <sup>a</sup> |
|-------------|-------------|----------------|--------------|-------|-------------------|
| Henry       | 386         | 67             | 6            | 459   | 35                |
| Hickory     | 287         | 54             | 3            | 344   | 59                |
| Holt        | 208         | 23             | 1            | 232   | 85                |
| Howard      | 358         | 63             | 10           | 431   | 43                |
| Howell      | 215         | 78             | 2            | 295   | 71                |
| Iron        | 176         | 31             | 1            | 208   | 93                |
| Jackson     | 161         | 33             | 5            | 199   | 95                |
| Jasper      | 281         | 34             | 3            | 318   | 66                |
| Jefferson   | 436         | 109            | 11           | 556   | 18                |
| Johnson     | 385         | 84             | 8            | 477   | 33                |
| Knox        | 249         | 22             | 0            | 271   | 72                |
| Laclede     | 532         | 158            | 12           | 702   | 4                 |
| Lafayette   | 192         | 52             | 3            | 247   | 80                |
| Lawrence    | 297         | 54             | 8            | 359   | 55                |
| Lewis       | 205         | 25             | 1            | 231   | 86                |
| Lincoln     | 290         | 75             | 7            | 372   | 53                |
| Linn        | 479         | 44             | 3            | 526   | 21                |
| Livingston  | 396         | 49             | 1            | 446   | 40                |
| Macon       | 513         | 74             | 8            | 595   | 13                |
| Madison     | 209         | 39             | 1            | 249   | 77                |
| Maries      | 453         | 131            | 10           | 594   | 14                |
| Marion      | 232         | 27             | 1            | 260   | 74                |
| Mcdonald    | 56          | 11             | 2            | 69    | 110               |
| Mercer      | 405         | 40             | 6            | 451   | 38                |
| Miller      | 602         | 106            | 6            | 714   | 3                 |
| Mississippi | 56          | 9              | 0            | 65    | 111               |
| Moniteau    | 307         | 70             | 7            | 384   | 47                |
| Monroe      | 434         | 71             | 7            | 512   | 26                |
| Montgomery  | 297         | 80             | 6            | 383   | 48                |
| Morgan      | 303         | 67             | 3            | 373   | 52                |
| New Madrid  | 63          | 1              | 0            | 64    | 112               |
| Newton      | 105         | 19             | 1            | 125   | 106               |
| Nodaway     | 180         | 39             | 2            | 221   | 90                |
| Oregon      | 179         | 73             | 2            | 254   | 76                |
| Osage       | 549         | 121            | 8            | 678   | 5                 |
| Ozark       | 158         | 56             | 4            | 218   | 91                |
| Pemiscot    | 22          | 1              | 0            | 23    | 113               |
| Perry       | 366         | 106            | 2            | 474   | 34                |
| Pettis      | 257         | 43             | 2            | 302   | 69                |
| Phelps      | 483         | 134            | 11           | 628   | 8                 |
| Pike        | 289         | 53             | 8            | 350   | 57                |
| Platte      | 190         | 31             | 2            | 223   | 89                |
| Polk        | 446         | 71             | 2            | 519   | 23                |

| County           | Adult Males | Subadult Males | Bearded Hens | Total | Rank <sup>a</sup> |
|------------------|-------------|----------------|--------------|-------|-------------------|
| Pulaski          | 374         | 97             | 8            | 479   | 32                |
| Putnam           | 528         | 38             | 3            | 569   | 17                |
| Ralls            | 206         | 24             | 1            | 231   | 87                |
| Randolph         | 309         | 45             | 4            | 358   | 56                |
| Ray              | 159         | 40             | 1            | 200   | 94                |
| Reynolds         | 212         | 32             | 1            | 245   | 82                |
| Ripley           | 133         | 30             | 2            | 165   | 98                |
| Saint Charles    | 258         | 38             | 5            | 301   | 70                |
| Saint Clair      | 475         | 62             | 12           | 549   | 19                |
| Saint Francois   | 300         | 73             | 2            | 375   | 51                |
| Saint Louis      | 115         | 9              | 0            | 124   | 107               |
| Sainte Genevieve | 461         | 141            | 3            | 605   | 12                |
| Saline           | 264         | 56             | 2            | 322   | 65                |
| Schuylerville    | 226         | 21             | 2            | 249   | 78                |
| Scotland         | 242         | 19             | 1            | 262   | 73                |
| Scott            | 116         | 34             | 2            | 152   | 100               |
| Shannon          | 270         | 59             | 2            | 331   | 61                |
| Shelby           | 210         | 28             | 3            | 241   | 83                |
| Stoddard         | 190         | 58             | 1            | 249   | 79                |
| Stone            | 187         | 50             | 3            | 240   | 84                |
| Sullivan         | 561         | 41             | 7            | 609   | 11                |
| Taney            | 170         | 74             | 2            | 246   | 81                |
| Texas            | 482         | 170            | 8            | 660   | 6                 |
| Vernon           | 462         | 51             | 8            | 521   | 22                |
| Warren           | 312         | 72             | 5            | 389   | 46                |
| Washington       | 296         | 80             | 2            | 378   | 50                |
| Wayne            | 248         | 67             | 1            | 316   | 67                |
| Webster          | 332         | 79             | 12           | 423   | 44                |
| Worth            | 114         | 22             | 3            | 139   | 103               |
| Wright           | 373         | 115            | 7            | 495   | 28                |

<sup>a</sup>Rank based on total harvest in Missouri's 114 counties.

## APPENDIX B.

2019 Missouri fall turkey harvest (firearms and archery seasons combined).

| County         | Adult Males | Adult Females | Subadult Males | Subadult Females | Total | Rank <sup>a</sup> |
|----------------|-------------|---------------|----------------|------------------|-------|-------------------|
| Adair          | 13          | 23            | 5              | 25               | 66    | 28                |
| Andrew         | 2           | 3             | 2              | 4                | 11    | 103               |
| Atchison       | 2           | 2             | 2              | 2                | 8     | 108               |
| Audrain        | 8           | 11            | 0              | 1                | 20    | 93                |
| Barry          | 2           | 4             | 2              | 1                | 9     | 106               |
| Barton         | 8           | 12            | 2              | 5                | 27    | 73                |
| Bates          | 8           | 12            | 3              | 1                | 24    | 81                |
| Benton         | 16          | 35            | 4              | 16               | 71    | 20                |
| Bollinger      | 13          | 25            | 10             | 22               | 70    | 22                |
| Boone          | 16          | 20            | 12             | 22               | 70    | 23                |
| Buchanan       | 4           | 2             | 1              | 2                | 9     | 107               |
| Butler         | 3           | 9             | 1              | 5                | 18    | 96                |
| Caldwell       | 1           | 7             | 2              | 3                | 13    | 102               |
| Callaway       | 24          | 37            | 10             | 23               | 94    | 7                 |
| Camden         | 25          | 26            | 9              | 16               | 76    | 17                |
| Cape Girardeau | 15          | 19            | 18             | 15               | 67    | 25                |
| Carroll        | 6           | 10            | 7              | 7                | 30    | 67                |
| Carter         | 8           | 5             | 4              | 6                | 23    | 86                |
| Cass           | 15          | 11            | 8              | 16               | 50    | 40                |
| Cedar          | 18          | 24            | 9              | 16               | 67    | 26                |
| Chariton       | 2           | 5             | 8              | 11               | 26    | 75                |
| Christian      | 11          | 25            | 7              | 7                | 50    | 41                |
| Clark          | 8           | 6             | 1              | 9                | 24    | 82                |
| Clay           | 11          | 12            | 3              | 4                | 30    | 68                |
| Clinton        | 1           | 7             | 0              | 2                | 10    | 104               |
| Cole           | 8           | 15            | 5              | 11               | 39    | 58                |
| Cooper         | 5           | 11            | 3              | 4                | 23    | 87                |
| Crawford       | 16          | 27            | 14             | 22               | 79    | 15                |
| Dade           | 10          | 19            | 4              | 12               | 45    | 46                |
| Dallas         | 21          | 21            | 9              | 20               | 71    | 21                |
| Daviess        | 18          | 14            | 4              | 8                | 44    | 48                |
| Dekalb         | 5           | 10            | 4              | 5                | 24    | 83                |
| Dent           | 22          | 19            | 15             | 25               | 81    | 10                |
| Douglas        | 7           | 14            | 4              | 4                | 29    | 71                |
| Dunklin        | 0           | 1             | 0              | 1                | 2     | 114               |
| Franklin       | 35          | 45            | 14             | 39               | 133   | 2                 |
| Gasconade      | 22          | 18            | 10             | 31               | 81    | 11                |
| Gentry         | 3           | 8             | 2              | 6                | 19    | 94                |
| Greene         | 35          | 64            | 14             | 41               | 154   | 1                 |
| Grundy         | 9           | 8             | 5              | 11               | 33    | 61                |
| Harrison       | 12          | 17            | 5              | 10               | 44    | 49                |

| County      | Adult Males | Adult Females | Subadult Males | Subadult Females | Total | Rank <sup>a</sup> |
|-------------|-------------|---------------|----------------|------------------|-------|-------------------|
| Henry       | 13          | 15            | 8              | 18               | 54    | 35                |
| Hickory     | 6           | 12            | 14             | 8                | 40    | 55                |
| Holt        | 9           | 9             | 1              | 4                | 23    | 88                |
| Howard      | 7           | 8             | 3              | 8                | 26    | 76                |
| Howell      | 18          | 12            | 6              | 7                | 43    | 50                |
| Iron        | 13          | 11            | 4              | 14               | 42    | 52                |
| Jackson     | 5           | 25            | 3              | 7                | 40    | 56                |
| Jasper      | 11          | 12            | 7              | 4                | 34    | 60                |
| Jefferson   | 30          | 28            | 4              | 11               | 73    | 18                |
| Johnson     | 7           | 26            | 8              | 11               | 52    | 37                |
| Knox        | 10          | 8             | 0              | 8                | 26    | 77                |
| Laclede     | 26          | 40            | 14             | 25               | 105   | 4                 |
| Lafayette   | 3           | 11            | 1              | 6                | 21    | 91                |
| Lawrence    | 19          | 17            | 8              | 6                | 50    | 42                |
| Lewis       | 7           | 9             | 3              | 6                | 25    | 79                |
| Lincoln     | 10          | 21            | 9              | 1                | 41    | 54                |
| Linn        | 7           | 16            | 4              | 13               | 40    | 57                |
| Livingston  | 13          | 13            | 7              | 15               | 48    | 44                |
| Macon       | 19          | 33            | 11             | 17               | 80    | 13                |
| Madison     | 5           | 14            | 3              | 11               | 33    | 62                |
| Maries      | 19          | 42            | 12             | 36               | 109   | 3                 |
| Marion      | 6           | 14            | 3              | 3                | 26    | 78                |
| McDonald    | 3           | 0             | 1              | 0                | 4     | 113               |
| Mercer      | 15          | 24            | 3              | 10               | 52    | 38                |
| Miller      | 21          | 24            | 11             | 24               | 80    | 14                |
| Mississippi | 1           | 3             | 0              | 2                | 6     | 111               |
| Moniteau    | 3           | 12            | 2              | 6                | 23    | 89                |
| Monroe      | 23          | 30            | 9              | 26               | 88    | 8                 |
| Montgomery  | 11          | 18            | 5              | 9                | 43    | 51                |
| Morgan      | 23          | 18            | 5              | 21               | 67    | 27                |
| New Madrid  | 1           | 2             | 1              | 2                | 6     | 112               |
| Newton      | 7           | 4             | 2              | 2                | 15    | 100               |
| Nodaway     | 1           | 4             | 0              | 3                | 8     | 109               |
| Oregon      | 5           | 6             | 7              | 15               | 33    | 63                |
| Osage       | 20          | 32            | 12             | 17               | 81    | 12                |
| Ozark       | 6           | 2             | 4              | 6                | 18    | 97                |
| Pemiscot    | 1           | 7             | 0              | 0                | 8     | 110               |
| Perry       | 9           | 16            | 9              | 11               | 45    | 47                |
| Pettis      | 9           | 10            | 2              | 2                | 23    | 90                |
| Phelps      | 12          | 24            | 9              | 18               | 63    | 30                |
| Pike        | 3           | 10            | 1              | 14               | 28    | 72                |
| Platte      | 4           | 10            | 3              | 2                | 19    | 95                |
| Polk        | 19          | 21            | 8              | 11               | 59    | 33                |

| County           | Adult Males | Adult Females | Subadult Males | Subadult Females | Total | Rank <sup>a</sup> |
|------------------|-------------|---------------|----------------|------------------|-------|-------------------|
| Pulaski          | 20          | 14            | 12             | 18               | 64    | 29                |
| Putnam           | 24          | 37            | 6              | 17               | 84    | 9                 |
| Ralls            | 5           | 8             | 5              | 6                | 24    | 84                |
| Randolph         | 4           | 19            | 1              | 6                | 30    | 69                |
| Ray              | 4           | 8             | 2              | 0                | 14    | 101               |
| Reynolds         | 15          | 9             | 5              | 13               | 42    | 53                |
| Ripley           | 7           | 14            | 6              | 6                | 33    | 64                |
| Saint Charles    | 11          | 12            | 3              | 6                | 32    | 65                |
| Saint Clair      | 9           | 24            | 1              | 15               | 49    | 43                |
| Saint Francois   | 26          | 27            | 16             | 33               | 102   | 6                 |
| Saint Louis      | 7           | 14            | 2              | 8                | 31    | 66                |
| Sainte Genevieve | 0           | 0             | 0              | 0                | 0     | 115               |
| Saline           | 18          | 26            | 13             | 20               | 77    | 16                |
| Schuylerville    | 9           | 8             | 3              | 10               | 30    | 70                |
| Scotland         | 5           | 1             | 3              | 7                | 16    | 98                |
| Scott            | 15          | 22            | 5              | 10               | 52    | 39                |
| Shannon          | 8           | 6             | 1              | 1                | 16    | 99                |
| Shelby           | 7           | 5             | 9              | 6                | 27    | 74                |
| Stoddard         | 7           | 11            | 0              | 7                | 25    | 80                |
| Stone            | 9           | 25            | 7              | 20               | 61    | 31                |
| Sullivan         | 5           | 9             | 5              | 2                | 21    | 92                |
| Taney            | 15          | 17            | 6              | 10               | 48    | 45                |
| Texas            | 9           | 7             | 3              | 5                | 24    | 85                |
| Vernon           | 31          | 32            | 14             | 28               | 105   | 5                 |
| Warren           | 7           | 23            | 11             | 14               | 55    | 34                |
| Washington       | 11          | 12            | 4              | 11               | 38    | 59                |
| Wayne            | 28          | 20            | 5              | 20               | 73    | 19                |
| Webster          | 23          | 23            | 6              | 17               | 69    | 24                |
| Worth            | 17          | 19            | 7              | 11               | 54    | 36                |
| Wright           | 0           | 5             | 3              | 2                | 10    | 105               |

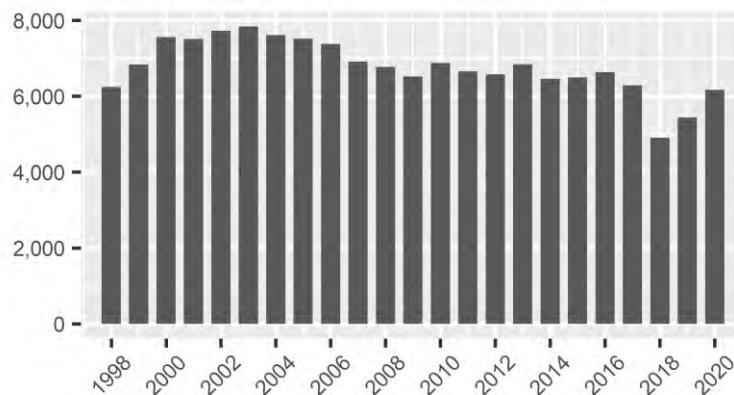
<sup>a</sup>Rank based on total harvest in Missouri's 114 counties.

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### Spring Turkey Harvest: Union Breaks



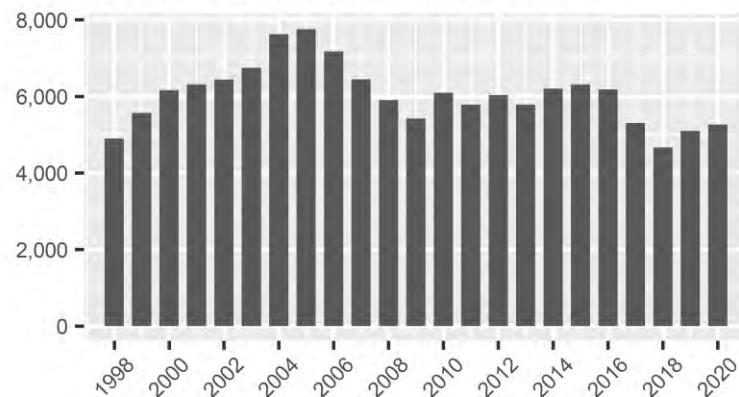
### Union Breaks Region

Turkey abundance in the Union Breaks Region peaked in the early 2000s. Abundance gradually declined during the mid-to-late 2000s and was stable from 2009-2017. After a sharp decline in harvest during 2018, harvest has increased during the past couple of years. The five- and ten-year spring turkey harvest trends in the Union Breaks Region indicate a declining population.

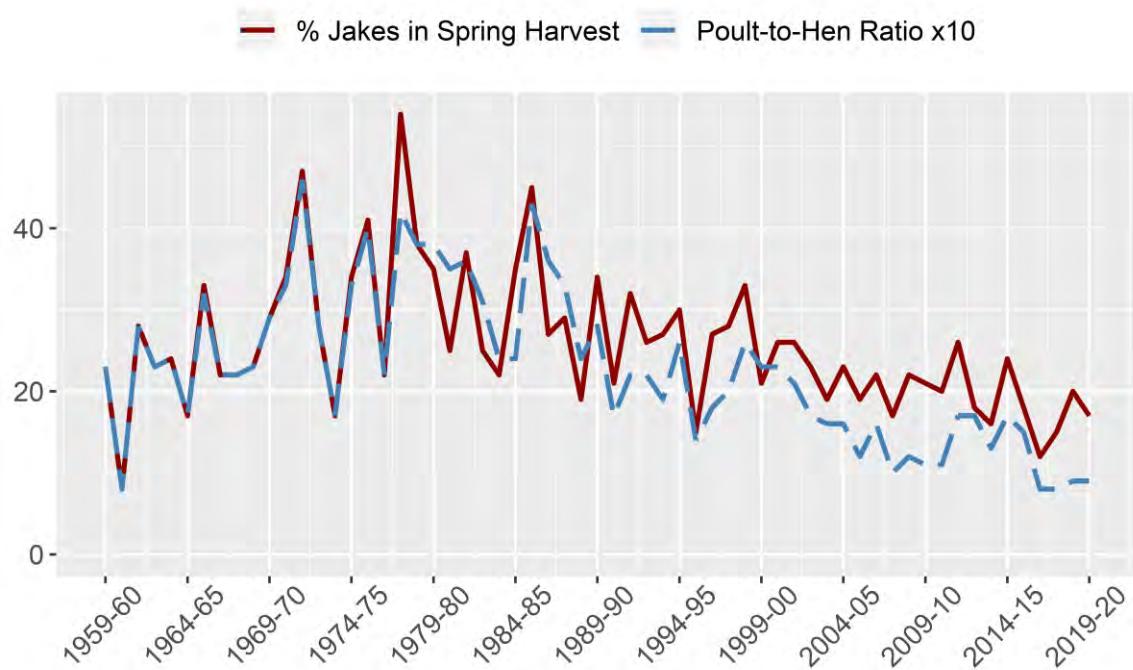
### West Prairie Region

The West Prairie Region turkey population peaked in the early-to-mid 2000s, and after declining from 2006-2009, abundance increased from 2010-2015. Harvest did decline from 2016-2018 but has increased in recent years. The five- and ten-year spring turkey harvest trends in the West Prairie Region indicate declining abundance.

### Spring Turkey Harvest: West Prairie



The total 2020 spring turkey harvest, including both the youth and regular seasons was 41,461. This harvest total was 7% more than the 2019 harvest total but was 3% less than the previous five-year average (Figure 4). Counties with the highest total spring harvest were Franklin, Callaway, and Miller where 962, 760, and 714 turkeys were harvested, respectively (Figure 5). Total permit sales for the 2020 spring turkey season (113,649; excluding no-cost landowner permits) were 22% greater than in 2019 and 11% greater than the previous five-year average (Figure 4). Spring turkey permits sales in 2019 included 106,564 (94%) resident permits and 7,085 (6%) nonresident permits. An additional 21,614 no-cost permits were distributed to landowners. The total number of unique spring turkey hunters in Missouri in 2020 was 133,022, which was 8% more than in 2019 but 3% less than the previous five-year average. Note that the total number of hunters does not equal the permit sales total because some hunters purchase a permit in addition to receiving a no-cost landowner permit.



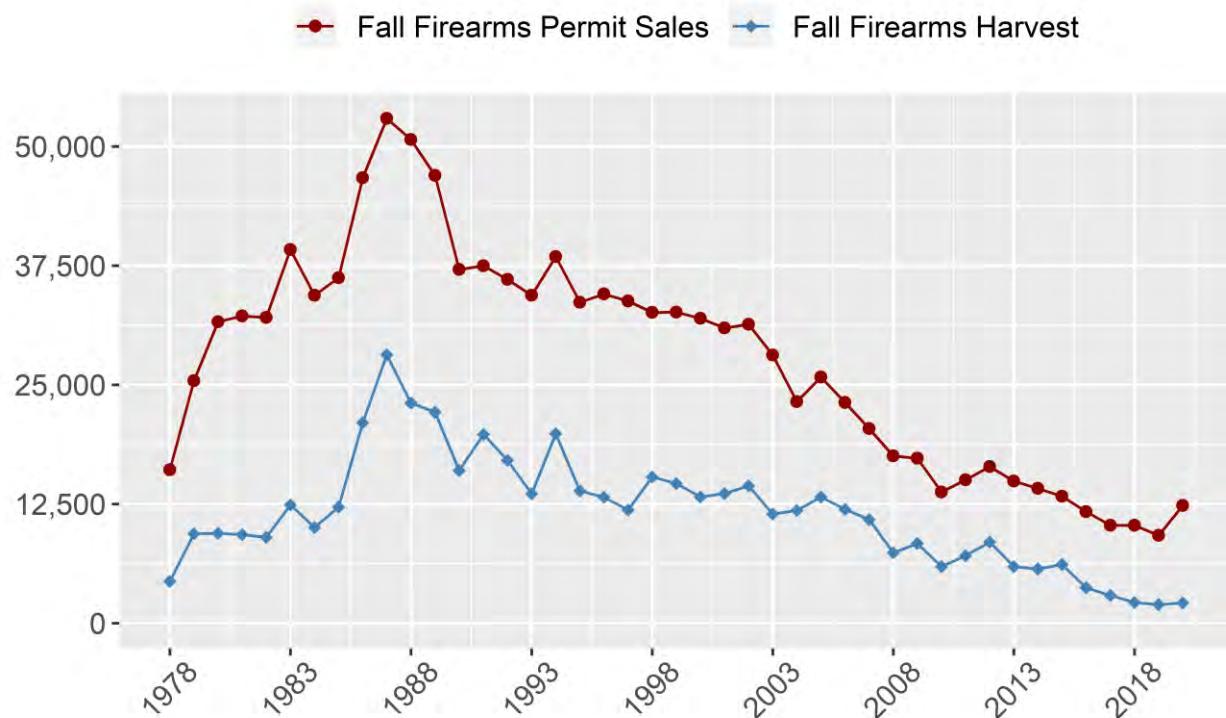
**Figure 3. Missouri's statewide poult-to-hen ratio multiplied by 10, compared with the percentage of jakes in the following year's regular season spring harvest, 1959-2020.**



## 2020 Fall Firearms Turkey Season

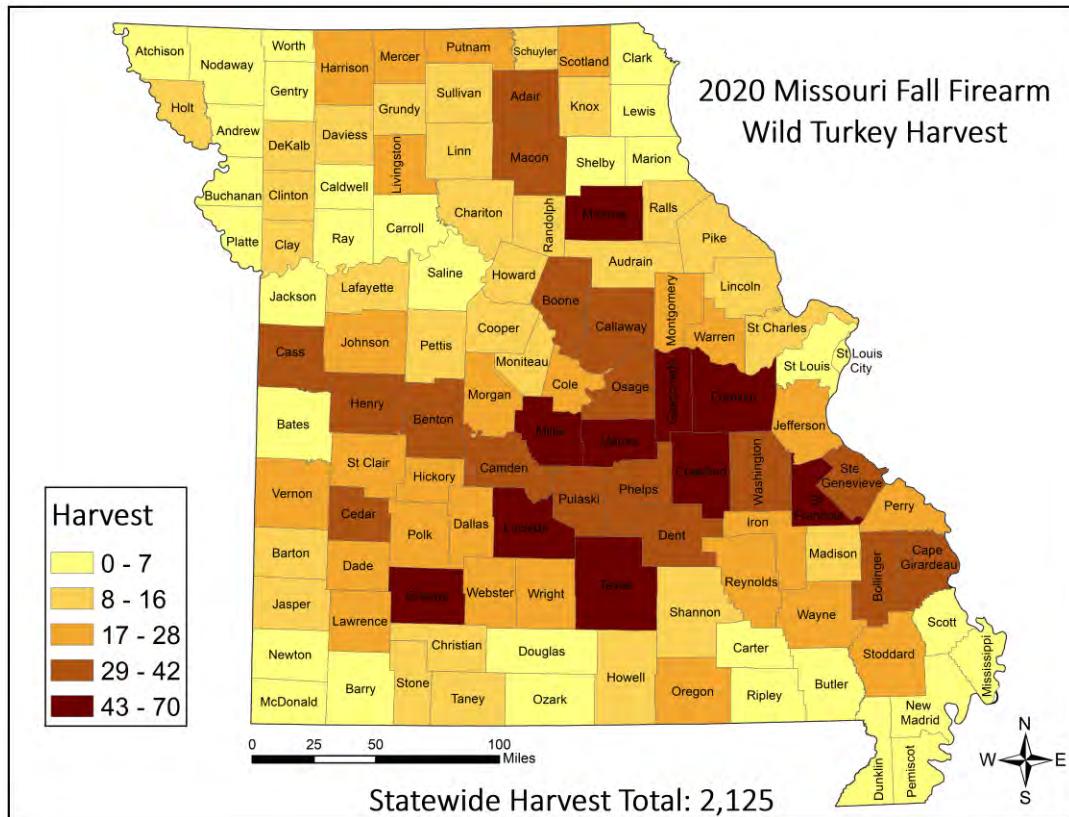
The 2020 fall firearms turkey harvest total of 2,125 was 9% greater than the 2019 harvest total but was 37% below the previous five-year average (Figure 6). The majority of the fall firearms harvest occurred in southern Missouri (Figure 7). The top harvest counties were Greene (70), Maries (58), and Franklin (55).

The fall firearms turkey permit sales total in 2020 (12,329) was 34% greater than the record-low 2019 permit sales total (9,195). This year was an exception to the long-term declining trend in fall firearms turkey hunting participation in Missouri (Figure 6).



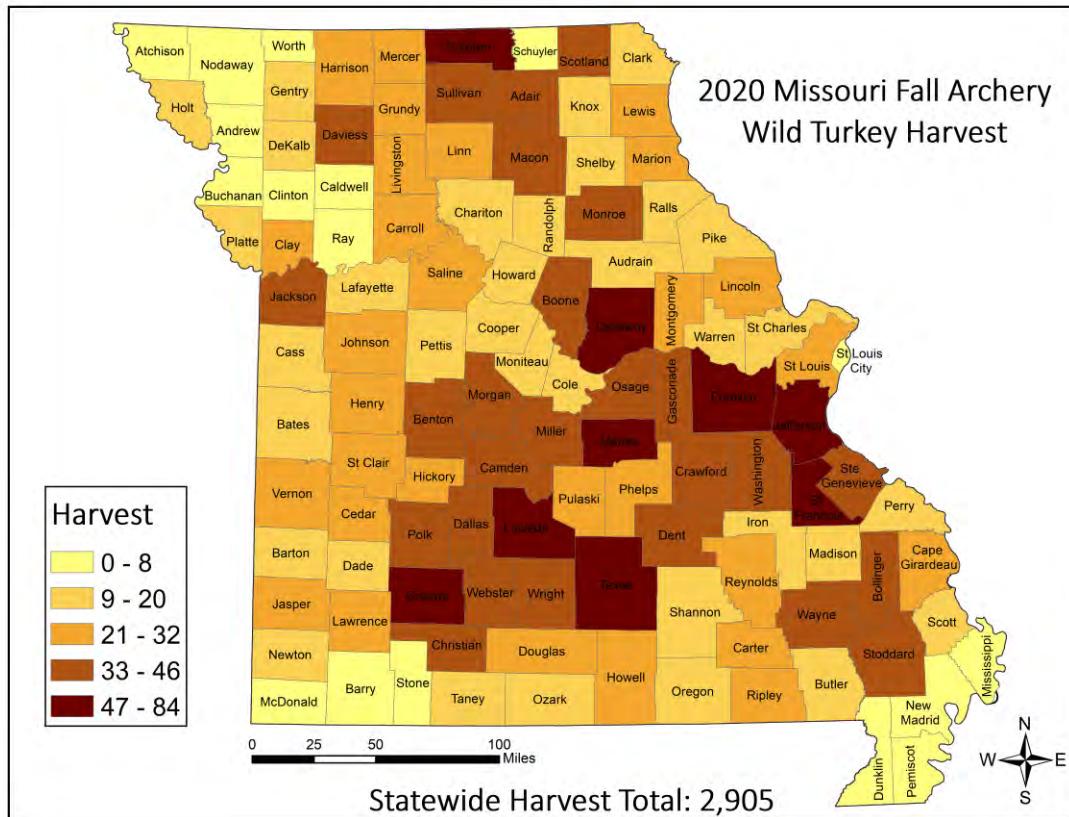
**Figure 6. Number of wild turkeys harvested during the fall firearms turkey season in Missouri and the number of fall firearms permits sold, 1978-2020. Permit sales do not include no-cost landowner permits.**





**Figure 7. Missouri fall firearms wild turkey harvest, 2020.**



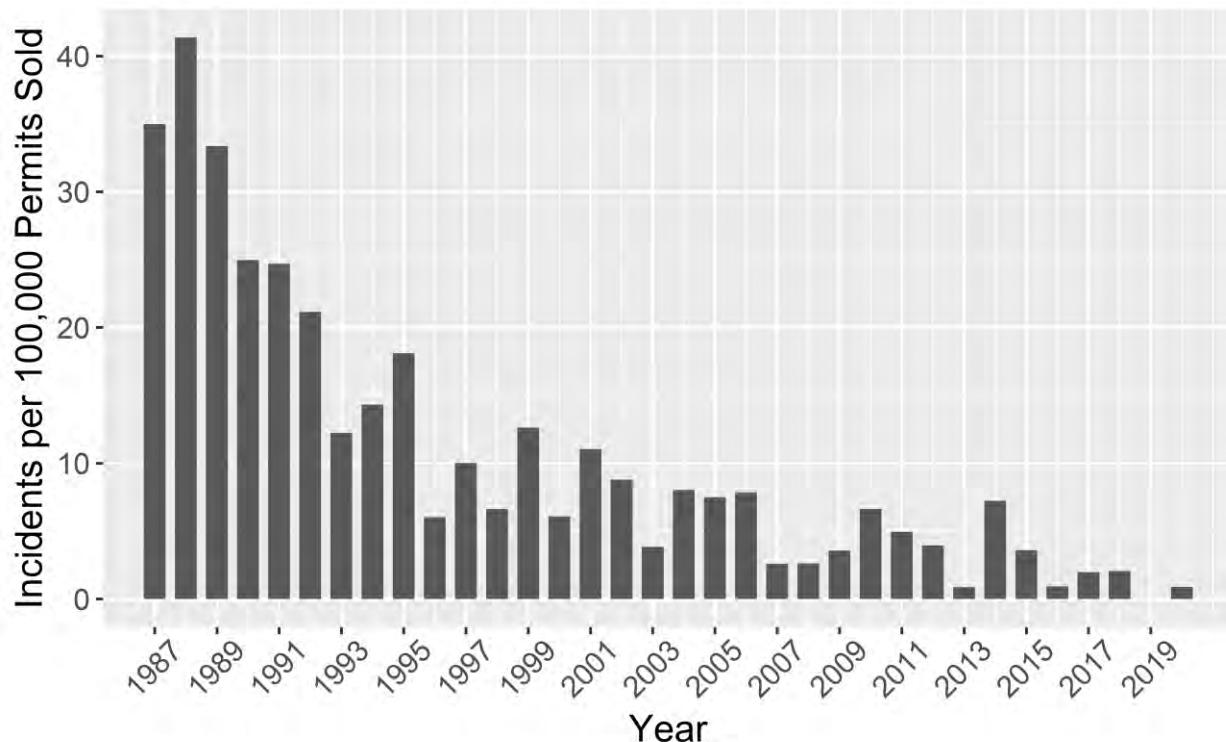


**Figure 9. Wild turkey harvest in Missouri during the 2020 fall archery season.**



## HUNTING INCIDENTS

There was one hunting incident during the 2020 spring turkey season. The number of spring turkey hunting incidents in Missouri has declined considerably over the course of the last three decades. During the late 1980s, more than 30 incidents occurred annually for every 100,000 permits sold. During the last five hunting seasons, the average number of incidents per 100,000 permits sold is 1.2 (Figure 10).



**Figure 10. Hunting incidents during the spring turkey season in Missouri per 100,000 permits sold, 1987-2020.**

## RECENT REGULATION CHANGES

Other than changes to some Conservation Area regulations and managed spring turkey hunts, no turkey hunting regulation changes occurred in 2020.

